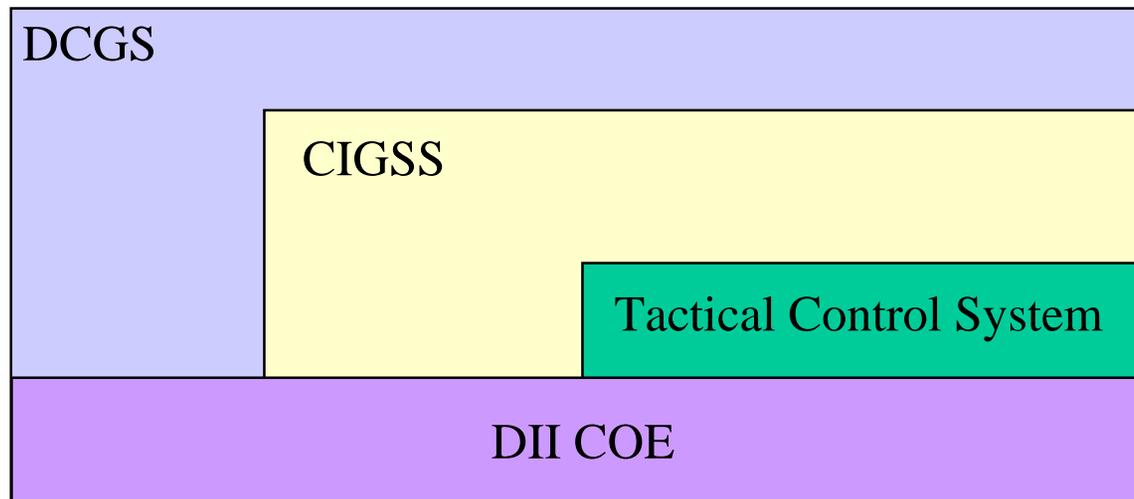




# TCS WITHIN CIGSS / DCGS



- DII COE is an implementation of the Joint Technical Architecture (JTA)
- TCS will be a DII Segment
- TCS within the CIGSS Architecture provides Tactical UAV GSS
- CIGSS is the Imagery Segment of the DCGS
- DCGS is an implementation of the Airborne Reconnaissance Information Technical Architecture (ARITA)



# OPEN SYSTEM ARCHITECTURE

- TCS is built to Open System standards
  - Built to Joint Technical Architecture (JTA) Standards
    - DII/COE 3.1
      - TCS will be a DII segment
      - TCS is using existing DII segments to satisfy TCS ORD requirements
  - Multi-platform support
    - Platforms currently supported by TCS
      - Army: CHS2 (Sun Sparc)
      - Navy: TAC 3 & 4 (HP)
    - Platforms planned
      - Windows NT PC, circa FY98
      - Silicon Graphics, circa FY98/99



# OPEN SYSTEM ARCHITECTURE

- Standards Based Development
  - POSIX
  - NITF 2.0
  - Network; 802-3/Ethernet, IAB - Standard 41 /TCP-IP, ANSI T1.630/ATM
  - STANAGs for NATO Customers: 7085, 7023, 7024
- CIGSS Standards
  - Incorporates NIMA and DISA products
    - Image Product Library (IPL)
      - Planned availability of an IPL for TCS - March/April 98
    - DISA DII Imagery Software
      - Using NITF Level 6 compliant SW
        - Same Imagery SW used by GCCS and JMCIS systems
      - SW is being incorporated into TCS now



# OPERATIONAL ARCHITECTURE (OA)

- **An OA is a description which defines the force elements and the requirement to exchange information between elements.**
- **It defines the types of information, the frequency of its exchange, and what warfighting tasks are supported by these information exchanges.**
- **It specifies what the system is required to do and where the operations are to be performed**

- *The TCS OA will be defined in the TCS Concept of Operation Document (CONOPS) under development by the TCS Warfighter IPT. The CONOPS will define what warfighting tasks are supported by the info exchange with each supported C4I system.*

- *TCS Interface Design Descriptions (IDDs) for the C4I systems listed in the TCS ORD specify the details for the UAV information type and frequency of its exchange*





# TCS LAND BASED OPERATIONAL ARCHITECTURE (EXAMPLE)

## 4 MODES:

- RADIO -
- HARDWARE VIDEO -
- HARDWARE MSE -
- NETWORK

## SINGGARS RADIO

- TACOMM
- NITF

**HARDWARE VIDEO (RS-170)**

## C4I SYSTEMS EXAMPLE:



JSTARS



TCS HMMWV

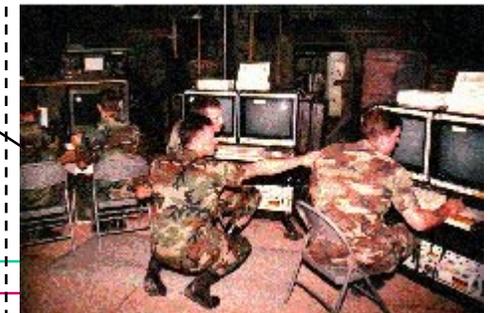
TACTICAL OPERATIONS CENTER (TOC)



TOC LAN

- TACOMM MSG
- NITF FILE
- VOICE
- VIDEO

**HARDWARE VIDEO (RS-170)**



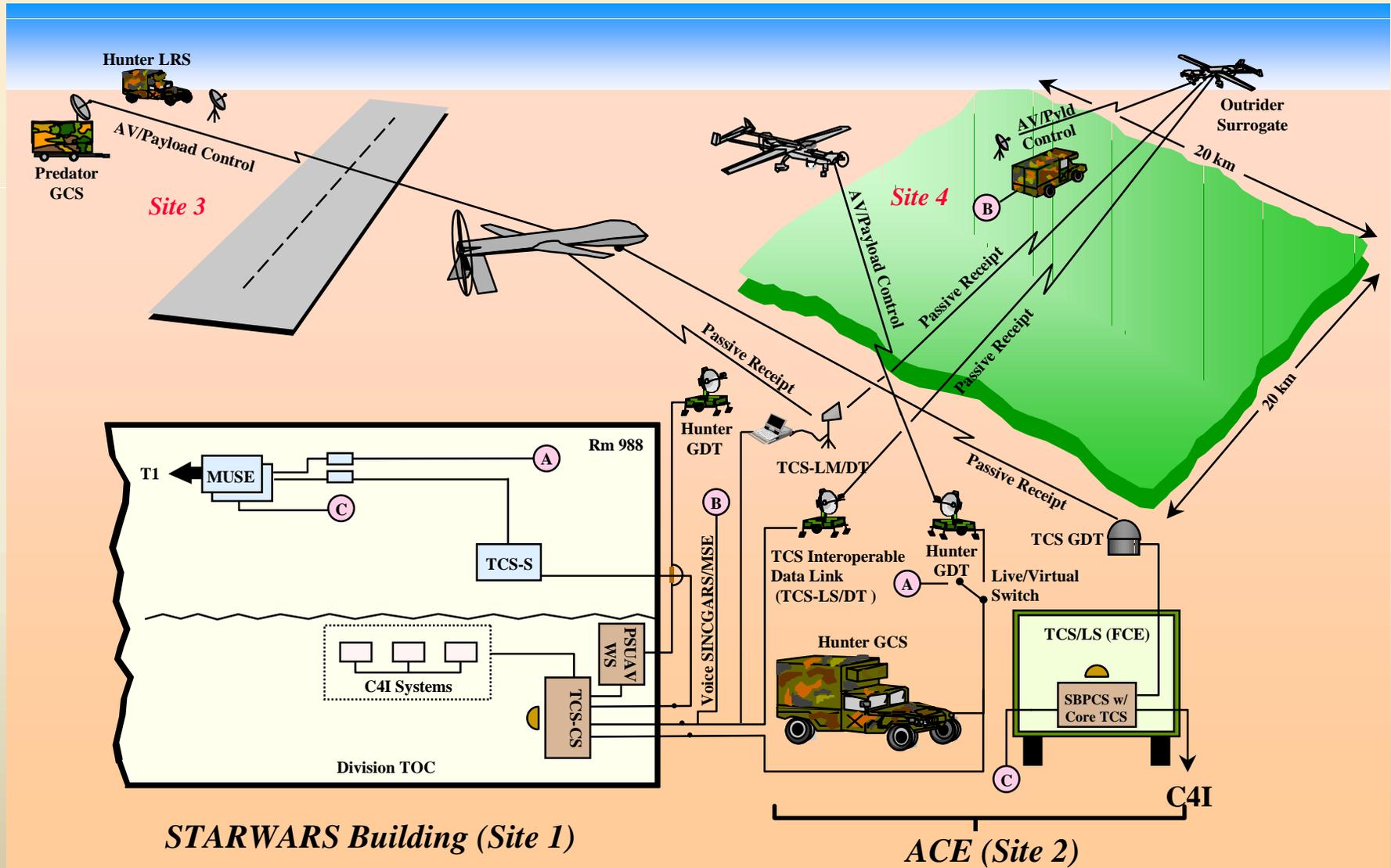
ASAS

**HARDWARE MOBILE SUBSCRIBER EQUIP. (MSE)**

- VOICE / DATA

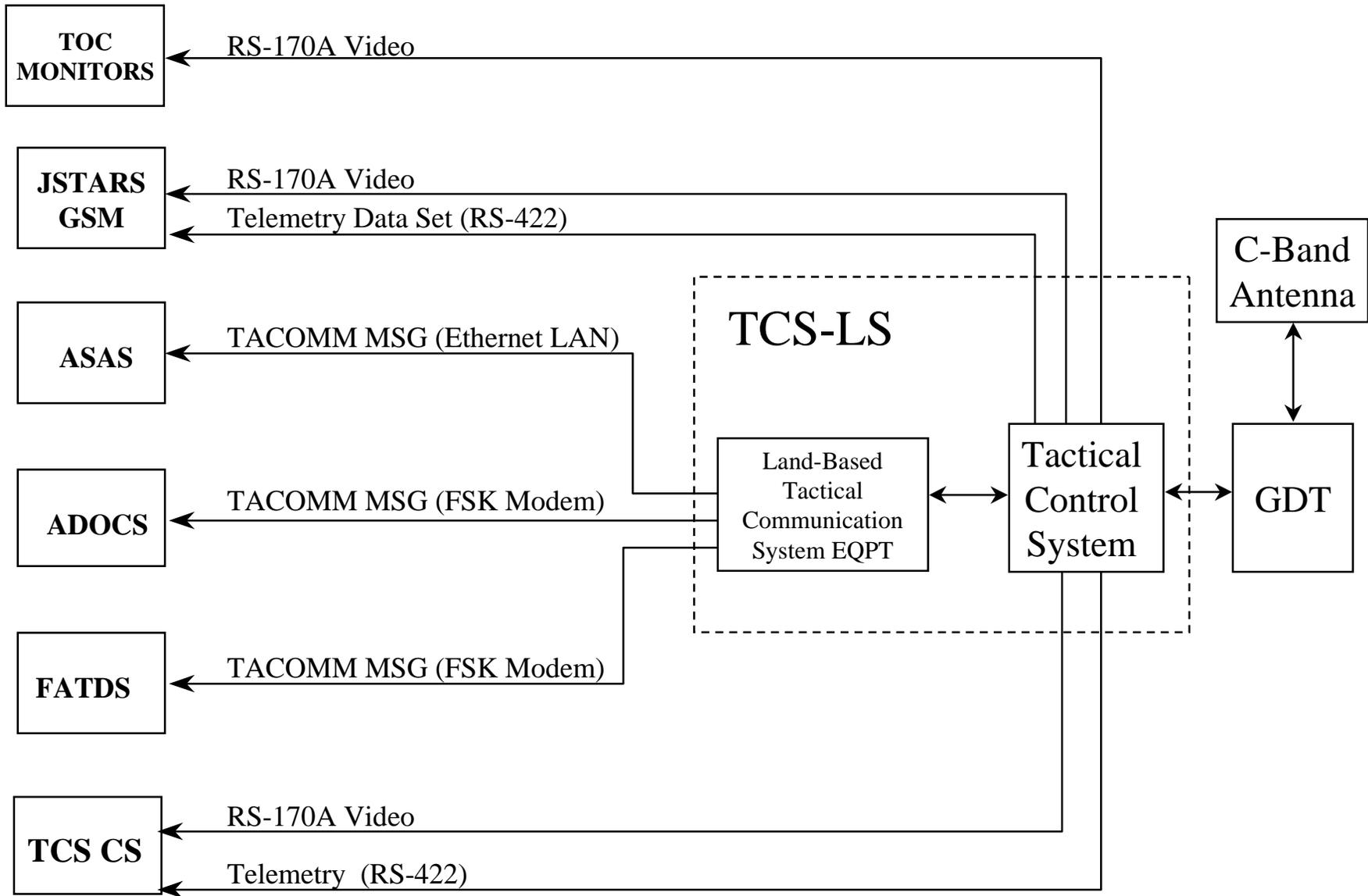


# OA EXAMPLE - TCS Participation in TFXXI



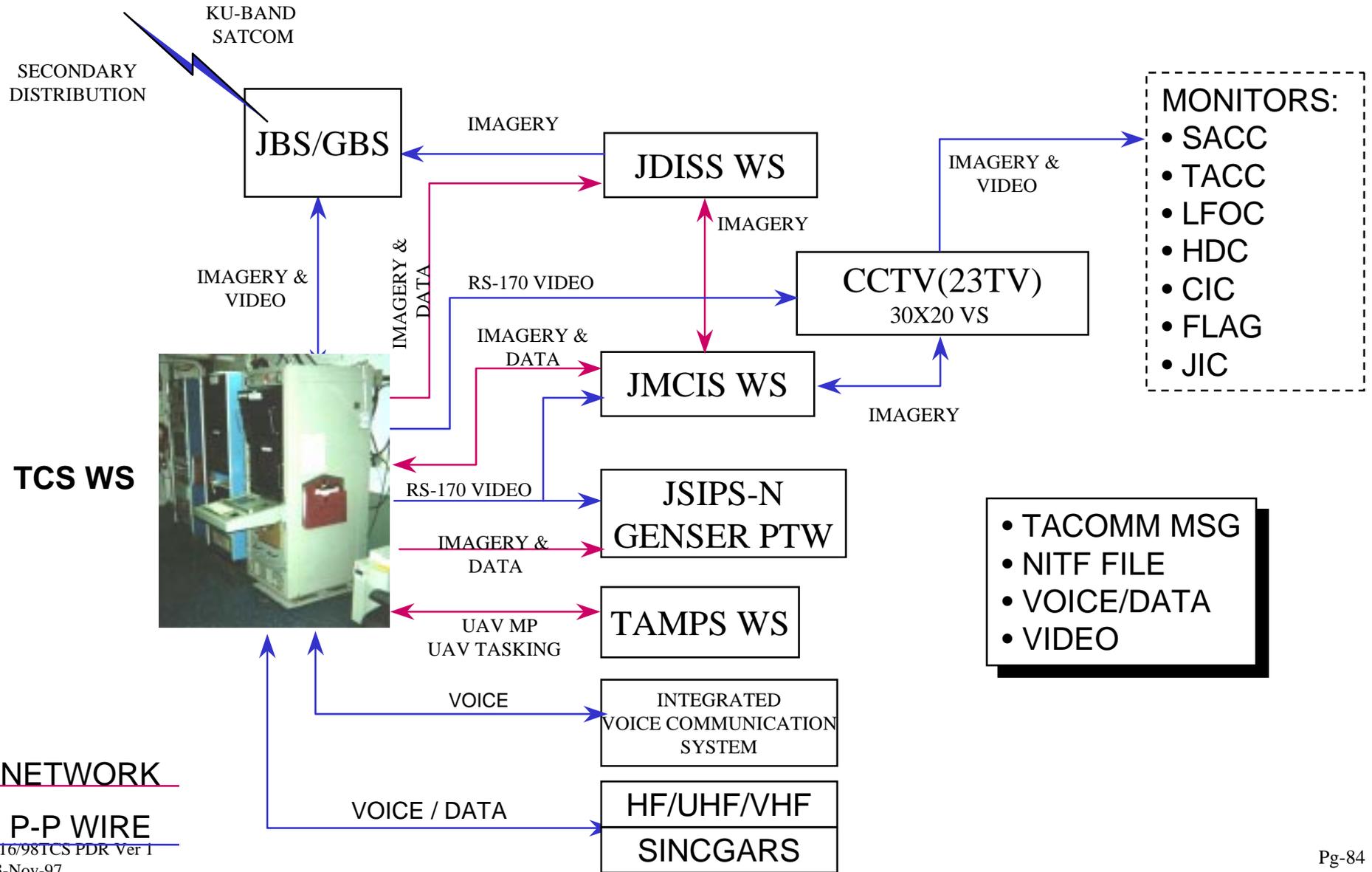


# TCS-LS C4I CONNECTIVITY



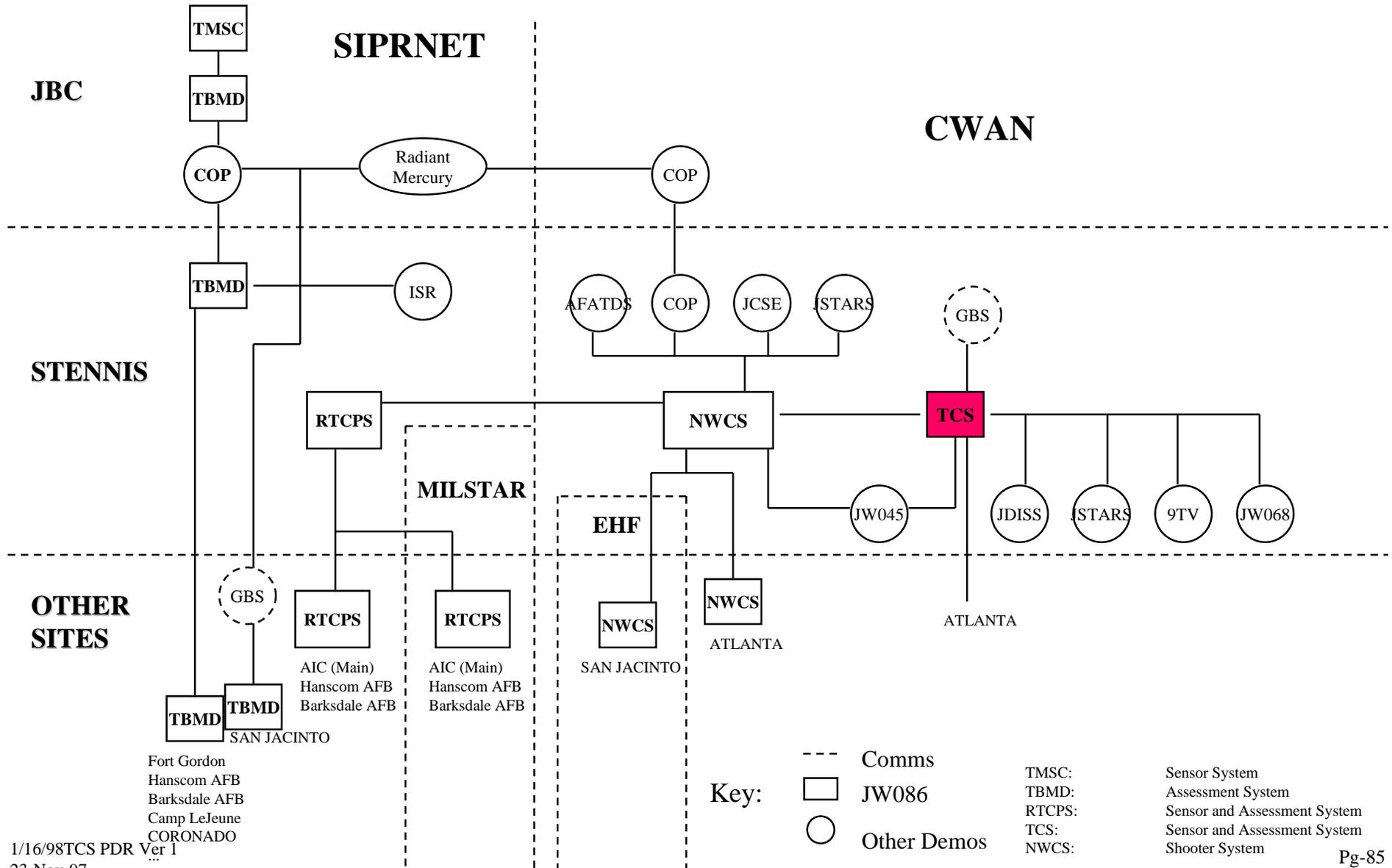


# TCS SEA BASED OPERATIONAL ARCHITECTURE (EXAMPLE)



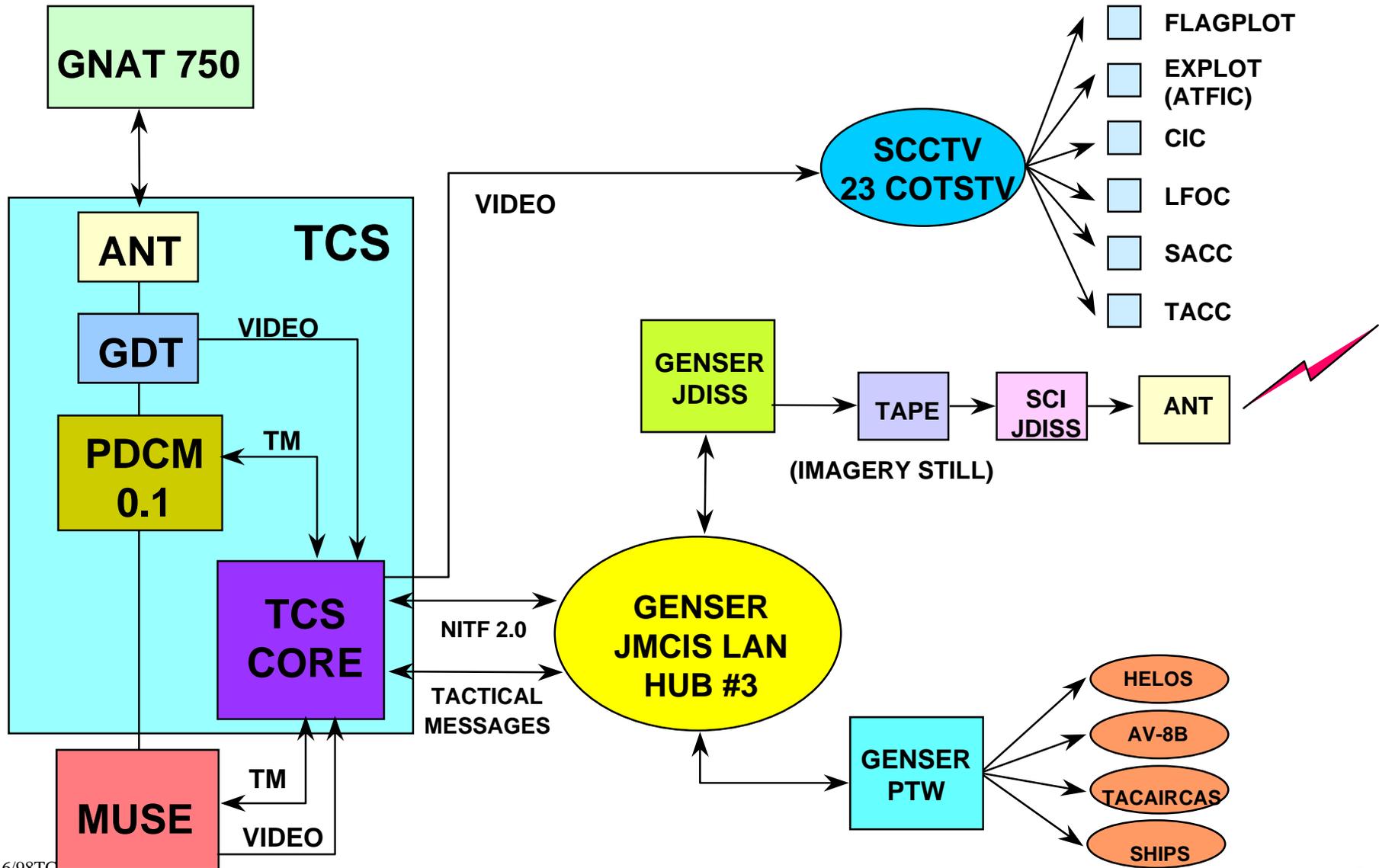


# JWID-97 JW086 “Sensor-to-Shooter” OPERATIONAL ARCHITECTURE





# USS TARAWA OPERATIONAL ARCHITECTURE "TCS C4I CONNECTIVITY"





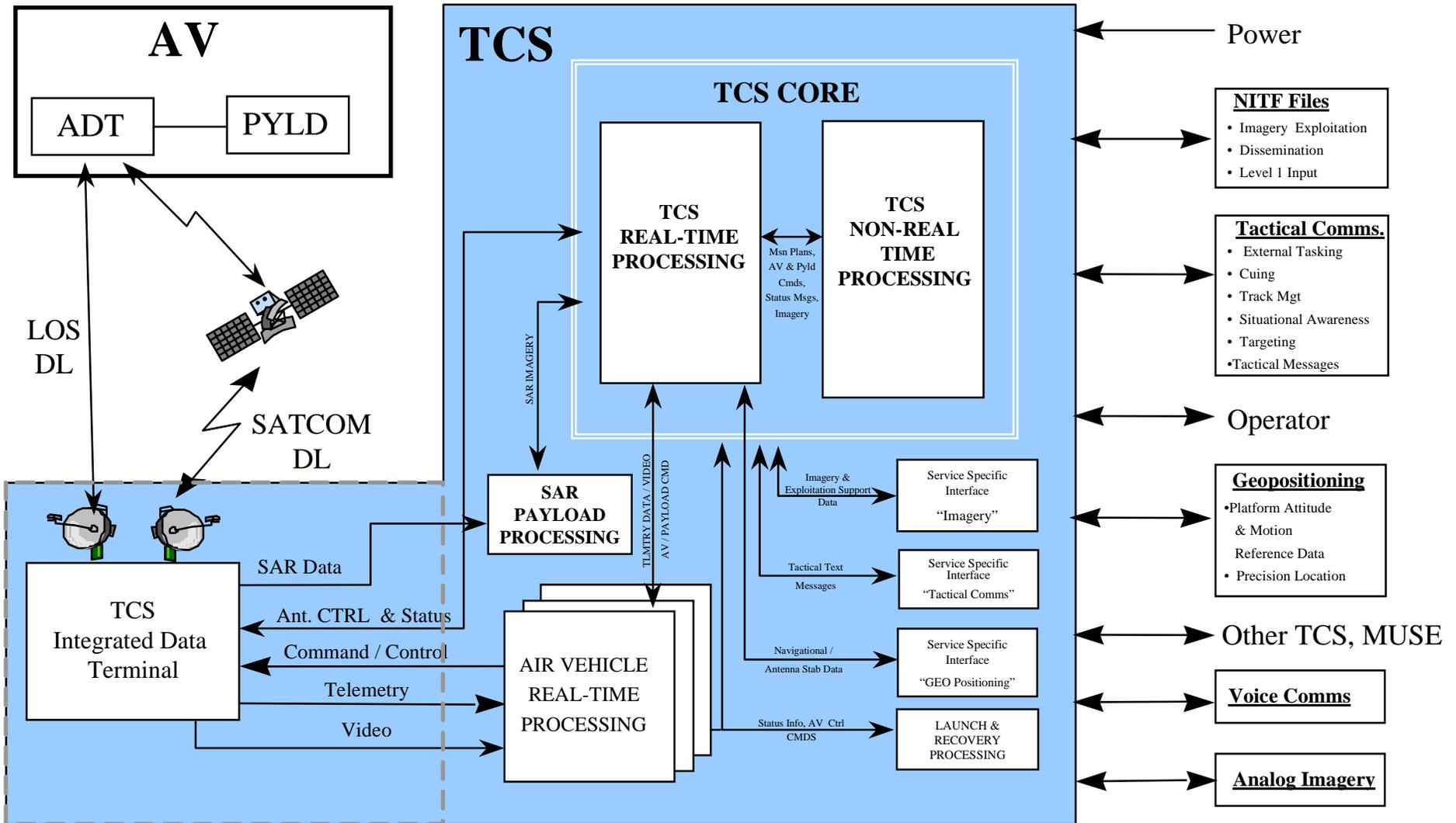
# SYSTEM ARCHITECTURE (SA)

- A System Architecture is a description of the system solution used to satisfy the warfighter's Operational Architecture (OA) requirement.
- It defines the physical connection, location, and identification of nodes, radios, terminal, etc.
- It specifies the system performance parameters
- Is constructed to satisfy OA requirements per the standards defined in the TA.

- *The TCS SA is defined in:*
  - TCS Operational Requirements Document (ORD)*
  - TCS System/Subsystem Specification (SSS)*
  - TCS System/Subsystem Design Description (SSDD)*
  - TCS I/F Requirements Specification / I/F Design Description (IRS/IDD)*
  - TCS Software Requirement Specification (SRS)*
  - TCS Hardware Performance Specification (HWPS)*
  - TCS Software Design Description (SDD)*
  - TCS Hardware Design Description (HDD)*



# TCS SYSTEM ARCHITECTURE



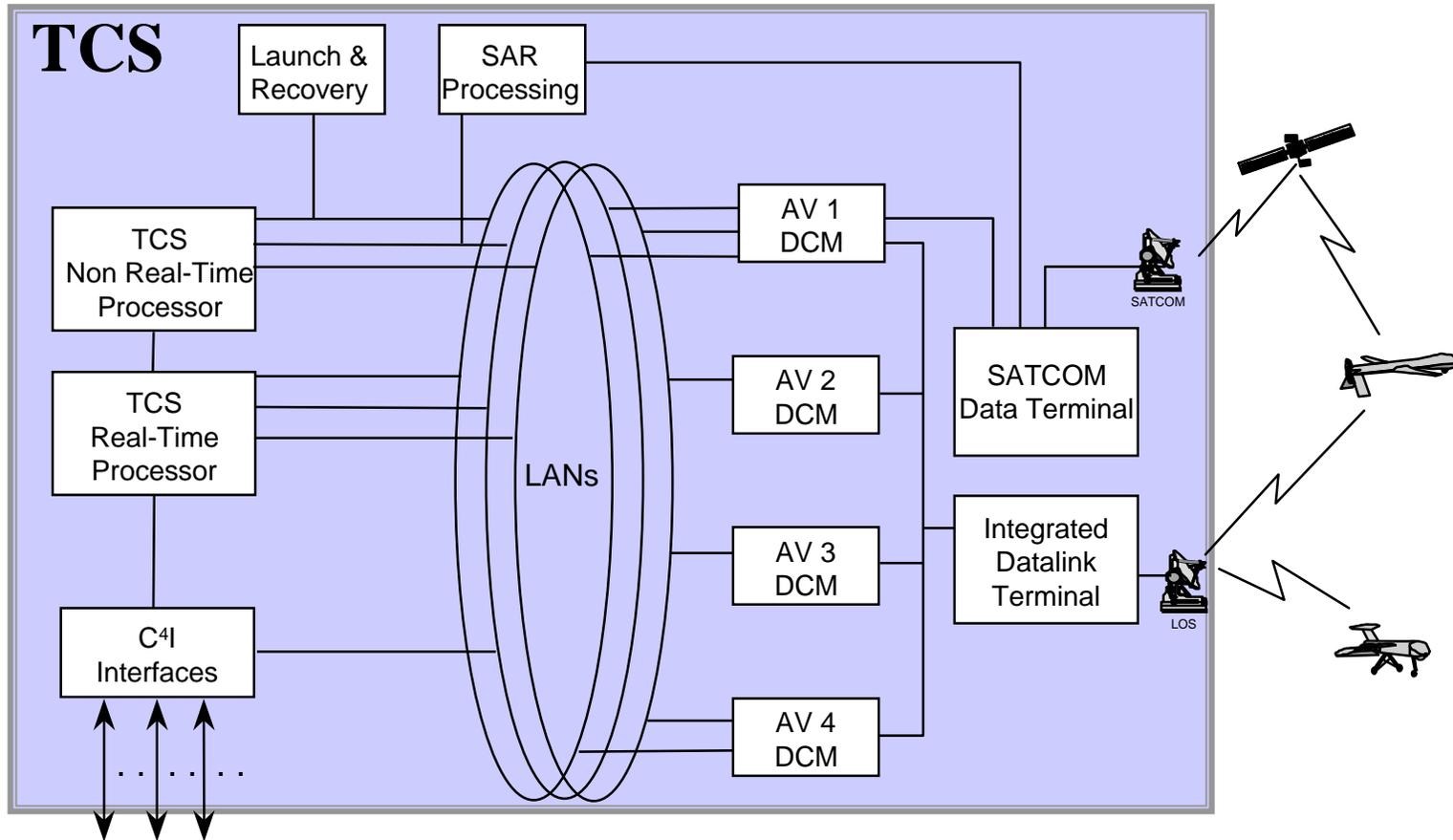


# TCS ARCHITECTURE

- **TCS is an Open Systems Architecture based on DoD and Commercial standards for open systems design**
  - **Modular**
  - **Scaleable**
  - **Network based**
- **TCS SW is developed within the DII COE**
  - **TCS SW :**
    - **Portable between DoD computing platforms**
    - **Maximize Re-Use**
    - **Minimize New Development**
    - **Use COTS SW solutions**
    - **Use GOTS SW solutions**
- **TCS HW implementation is designed using open-system principles**
  - **COTS based**
  - **Maximize application of DoD standard hardware (TAC, CHS-II)**

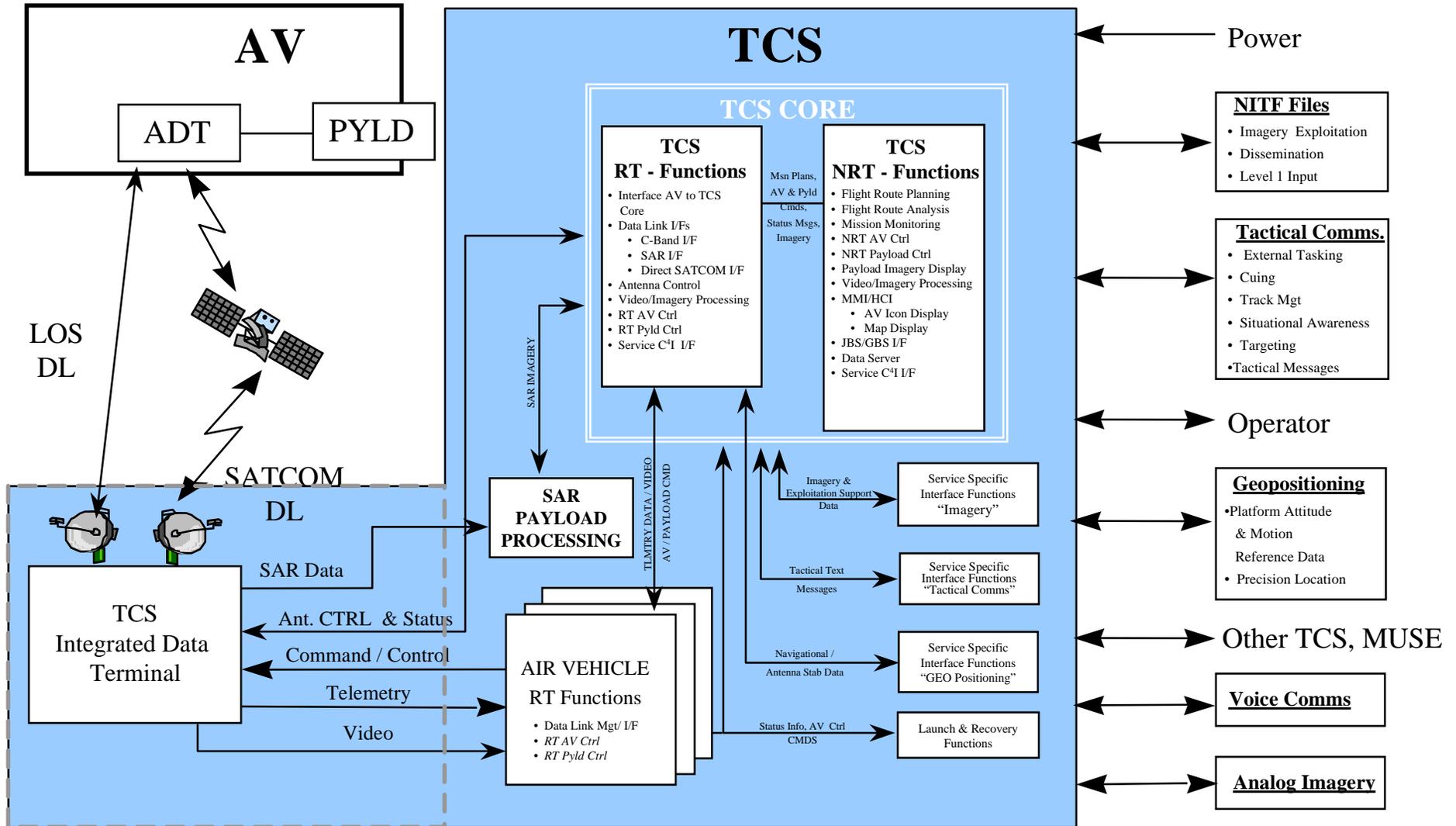


# TCS SYSTEM ARCHITECTURE





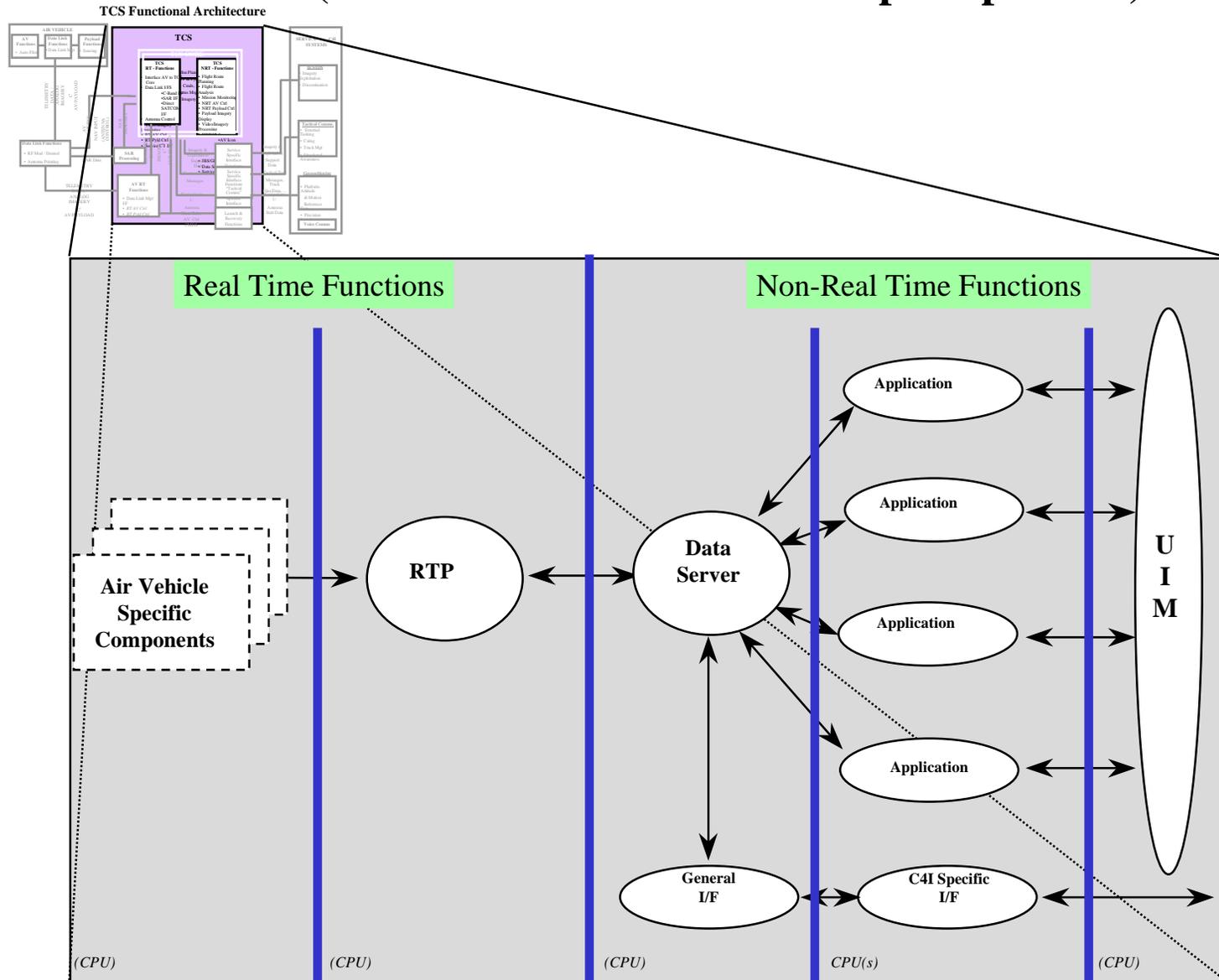
# TCS FUNCTIONAL ARCHITECTURE





# TCS FUNCTIONAL ARCHITECTURE

(TCS SW Architecture Concept Expansion)





# TCS SUBSYSTEMS

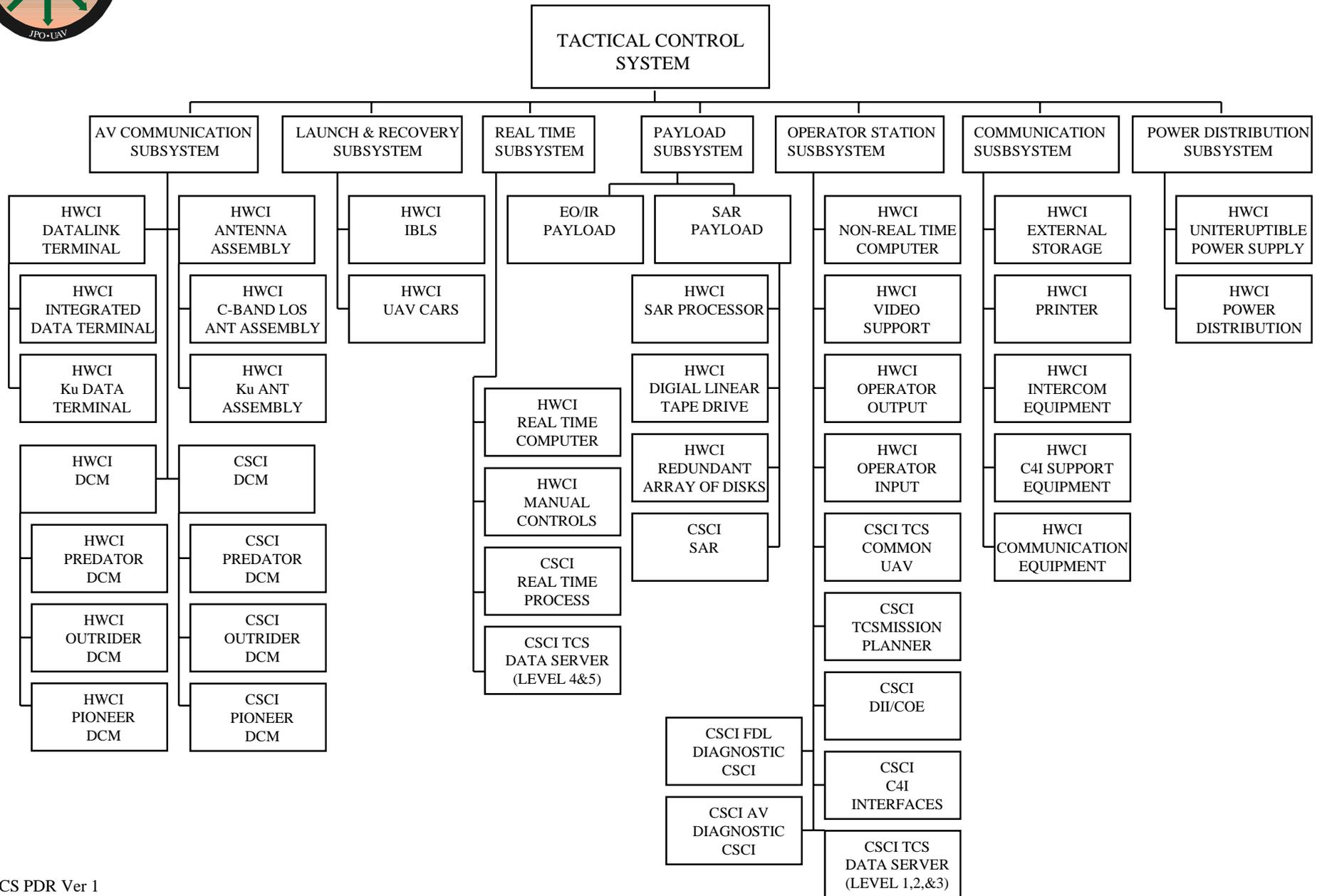


# TCS SUBSYSTEMS

- Top Level System Design
- Subsystem Preliminary Design
  - Aerial Vehicle Communications Subsystem
  - Launch & Recovery Subsystem
  - Real-Time Subsystem
  - Payload Subsystem
  - Operator Station Subsystem
  - Communication Subsystem
  - Power Distribution Subsystem

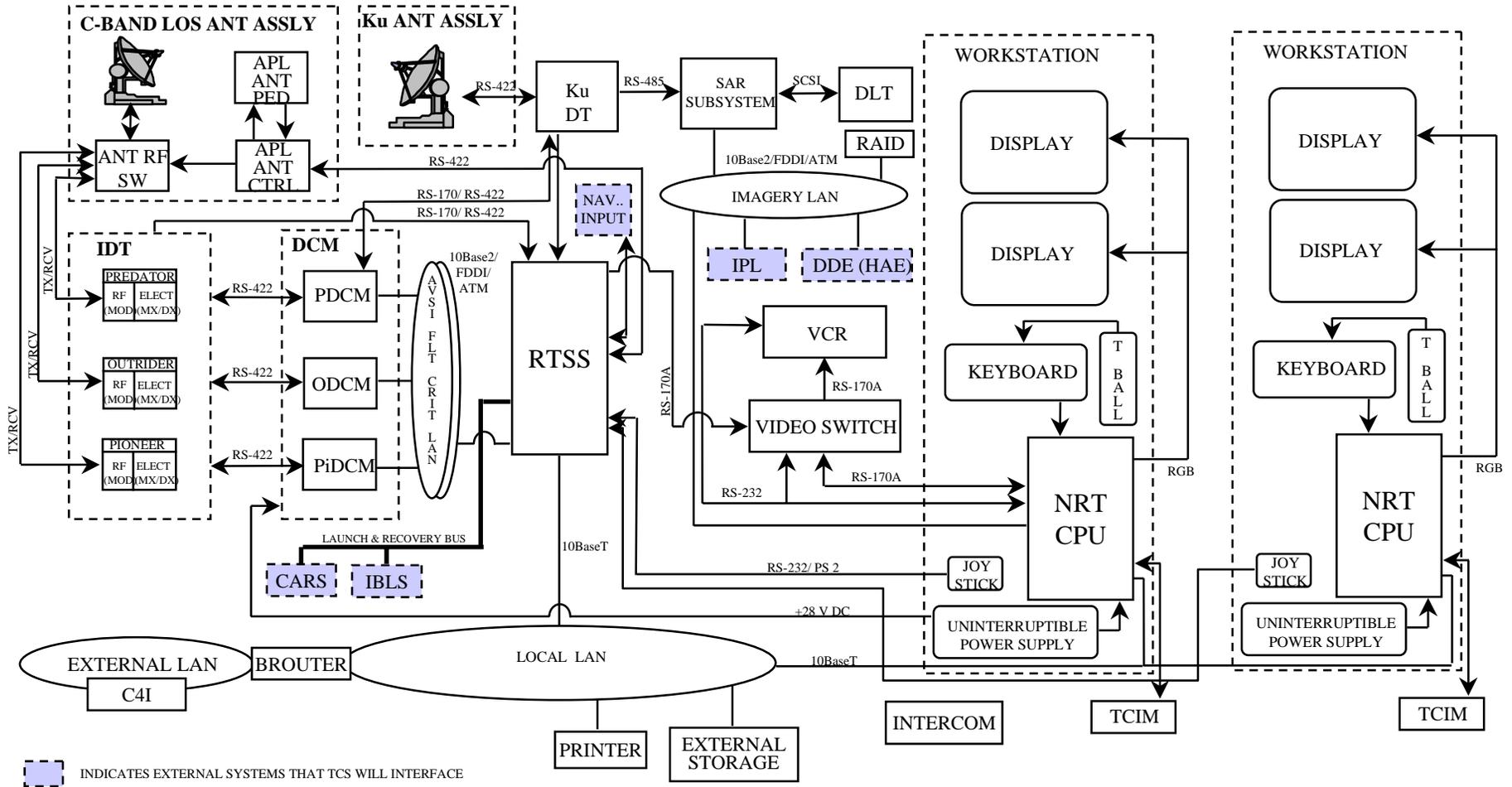


# TCS SYSTEM DESIGN





# TCS SYSTEM HARDWARE DESIGN





# SUBSYSTEM PRESENTATIONS

- SUBSYSTEM IDENTIFICATION
  - SUBSYSTEM BLOCK DIAGRAMS
  - SUBSYSTEM FUNCTIONALITY
  - SUBSYSTEM INTERFACES

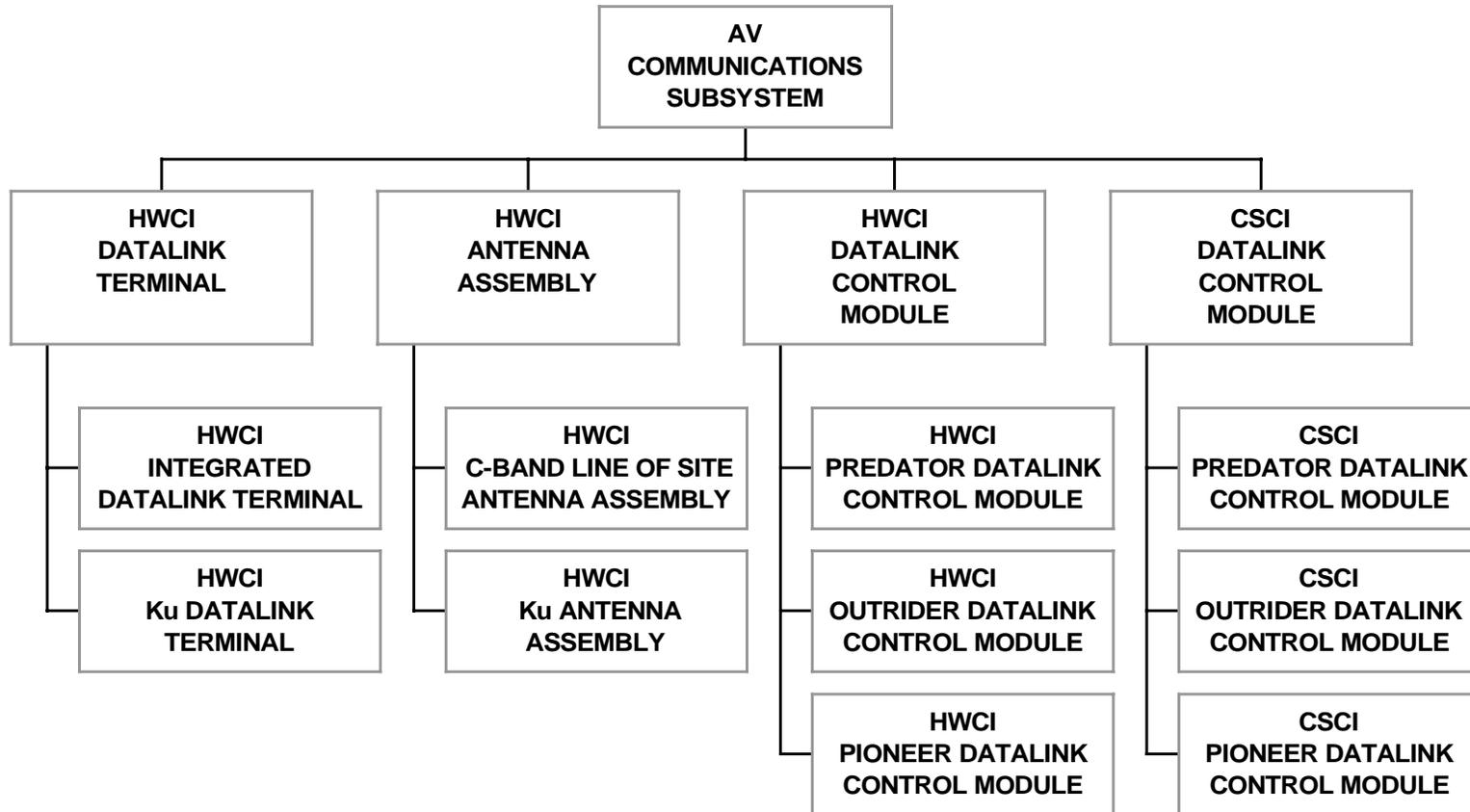


# SUBSYSTEM PRELIMINARY DESIGN

- **AV COMMUNICATIONS SUBSYSTEM**
  - C-Band LOS Antenna Assembly Design
  - C-Band Integrated Data Terminal Design
  - Ku-Band SATCOM Antenna Assembly Design
  - Ku-Band SATCOM Downsized Link Manager Assembly Design
  - AV Datalink Communications Module (DCM) Design



# AV COMMUNICATIONS SUBSYSTEM





# AV COMMUNICATIONS SUBSYSTEM

- PROVIDE DATA INTERFACE BETWEEN TCS AND AV(s) VIA DATALINK TERMINAL (DT), DATALINK CONTROL MODULE (DCM), AND ANTENNA ASSEMBLY
- DT SUPPORT COMMUNICATION WITH ADT TO
  - ACCOMPLISH LAUNCH AND RECOVERY
  - FLIGHT OF THE AV
  - CONTROL OF THE AV PAYLOAD(s)
- DCM PROVIDE TCS FUNCTIONALITY TO PERFORM REAL-TIME PROCESSING TO MAINTAIN CLOSE-LOOP COMMUNICATION AND CONTROL OF AV
- ANTENNA ASSEMBLY PROVIDE AN ANTENNA SYSTEM TO ALLOW THE TCS TO COMMUNICATE OVER
  - C-BAND LOS TO APPROACH AV
  - Ku-BAND SATCOM TO SATCOM CAPABLE AV